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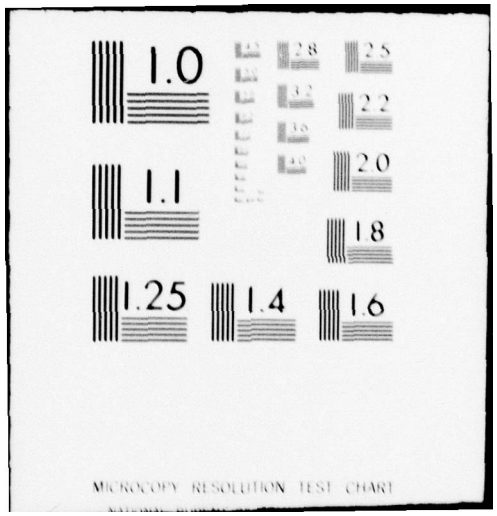
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DIURNAL FLUCTUATIONS IN THE NUMBERS OF ATMOSPHERIC BACTERIA IN AN OBSTETRIC AND GYNECOLOGIC CLINIC

by

S. Krynski, A. Samet, et al.

EDITED TRANSLATION

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S. Krynski, A. Samet, R. Bugalski, L. Michalak, K. Kamienska.

DIURNAL FLUCTUATIONS IN THE NUMBERS OF ATMOSPHERIC BACTERIA IN AN OBSTETRIC AND GYNECOLOGIC CLINIC

Microbiology Dept., Gdansk Medical School, Director: Prof. S. Krynski.

II. Obstetrics and Gynecology Clinic, Gdansk Medical School, Director: Prof. W. Gromadzki.

The number of bacteria in the air in a gynecologic ward is lowest at night and peaks in the daytime during the cleaning hours, after meals and after visiting hours. The number of bacteria in the air of an obstetric ward as a function of time is dependent on the time and number of deliveries.

The most common method used to evaluate the bacteriological content of air is based on marking of either a total number of bacteria falling onto a given surface in a given time, e.g. per $1m^2$ per 1 hour, or a given volume e.g. in $1m^3$. In this work we analyse bacteriological content in the obstetrics and gynecology clinics. It seemed to us interesting to compare the results from these two wards which are so closely interconnected yet so very different in character.

Material and Methods

We used two kinds of culture media: based on meat broth and Barber and Kuper medium (1). Four to eight culture plates were placed at the bed right in every area under investigation and were exposed for 30 minutes. The culture were exposed for 30 minutes. The culture was then kept at 37°C for the first 24 hours and at room temperature and in the light for the next 24 hours. The results were normalized to a 1 hour time period and to an area of $1m^2$. Each measurement was repeated every three hours $\frac{\text{2am, 5am, 8am, 11am, 2pm, 5pm, 8pm, 11pm}}{2\ ,\ 5\ ,\ 8\ ,\ 11\ ,\ 14\ ,\ 17\ ,\ 20\ ,\ 23}$. During the observation, the situation and activities in the clinic were carefully monitored. Studies in the obstetrics ward were performed in March, May and November 1967. This work describes only two latest studies. Gynecological ward studies were conducted in March and November. It is worthwhile noting that the epidemiological situation (6) in the II Obstetrics and Gynecology Clinic is greatly influenced by the "rooming in" system (8) used for the last ten years.

Results

A. Obstetrical Ward

Delivery room.

According to the study conducted in May an average diurnal number of bacteria fallen onto $1m^2$ area in 1 hour was 17000 (Fig. 1). Note that between 11am and 8pm (20th hour) the number of bacteria was fluctuating between 8000 and 14000 and significant increase up to 29000 occurred in the night at 11pm (12th hour) and 2am (2). This was followed by a decrease down to 12000 (Fig. 2). The bacteria count as a function of time is correlated with delivery room conditions in the day of study. The last delivery ended at about 11pm (23rd hour). The general cleanup was initated taking advantage of the absence of women in labor. It had ended at 3am (3). During November studies, there was a great number of deliveries and the delivery room was constantly busy. The diurnal average was counted to be 13000 (Fig. 1). May and November data agreed after correction for cleanup data was made. The discrepancy was insignificant (Fig. 3). The index of the micrococcus resistance (4,7) was 50.9 in May and 46.9 in November.

Hallways

In the hallways the diurnal average was greater in November than in May (Fig. 1), which was caused by greater number of deliveries in November and also by the presence of III year medical students having studying clinical pediactrics. A temporary increase in the bacteria count in the air, observed at 11pm (23 hours) and 2am (2) in May and at 5pm (17th hour) in November (Fig. 3), was a result of the cleanup and was caused mostly by the removal of dirty laundry from the labor room.

The micrococcus resistance index in both studies was basically the same: 53.2 in May and 51.2 in November.

Labor and Infant Rooms

Spring results (Fig. 1) correspond to the assumptions of the "rooming in" system: the largest number of bacteria appeared in the air of the room "a" (forth and last 24 hours of stay) and "b" (third 24 hours), and smallest in "d" (first 24 hours after childbirth).

The situation in November (Fig. 1) was different due to the facts mentioned when hallway results were described. In the "c" room (second day of stay) the diurnal average was significantly higher than in the other rooms because of the presence of students being trained in infant physiology.

The bacteria count increase in various rooms was related to change of linens, especially diapers and to cleaning. The resistance index was 50.0 in May and 54.9 in November, the difference being insignificant.

B. Gynecological Ward

March study revealed that the highest air bacteria count was at 8am (8), 2pm (14th hour) and 8pm (20th hour) (Fig. 4), e.g. during the cleaning hours and after meals. The results from patient rooms and hallways were very similar (Fig. 5). The November counts were higher and more varied as a function of room. Visiting hours ended at 5pm (17 hours) and bacteria count was highest next morning during cleaning hours. Most of the bacteria were Sarcinae and Bacilli.

The resistance index was found to be: 57.7 in patient rooms and 57.7 in the hallways in May; 55.7 and 54.0 respectively in November.

Discussion

The time dependence of the number of bacteria in the air of gynecological ward in the time period of 24 hours is related to the work cycle. The diurnal average is determined by the number of visitors bringing in a typical street dust bacteria (Sarcinae and Bacilli), which are not disease forming (5).

In the obstetrical ward the work depends on the number and time of deliveries. Cleaning and linen change is done when convenient and much more often than in the gynecological ward. Because of this, we found it difficult to find a time of study, enabling a comparison of the wards.

The total number of bacteria in the air depends on 3 factors:

1. The degree of cleanliness of the floors (9,10).
2. Traffic in the room (dust from the floor and various objects being carried up in the air) (3,9,10).
3. Bacteria flow from the respiratory tracts of patients and visitors (2,3,9).

The bacterial count can only determine the danger of epidemic to a degree to which the latter is dependent on the cleanliness of the ward. It is necessary to conduct a qualitative study (2,4,5,6,7,9,10,11) to assess the danger. Our efforts to reduce hospital infections will have to be aimed at developing methods enabling fast and easy determination of the kind and number of disease-forming bacteria or of the microorganisms present when the disease-forming bacteria can potentially flourish (4,7,9).

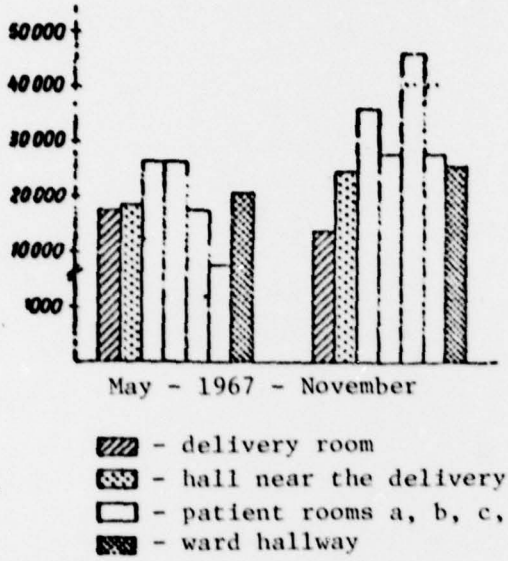

Fig. 1 Diurnal fluctuations of the total number of bacteria in the air of the obstetrician and gynecology clinic.

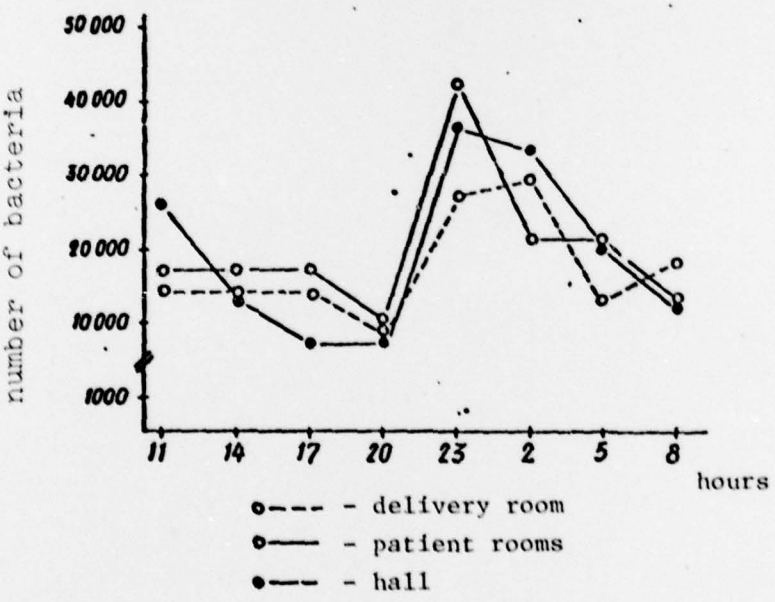

Fig. 2 Dirunal fluctuations of the total number of bacteria in the air of the obstetrics and gynecology clinic.

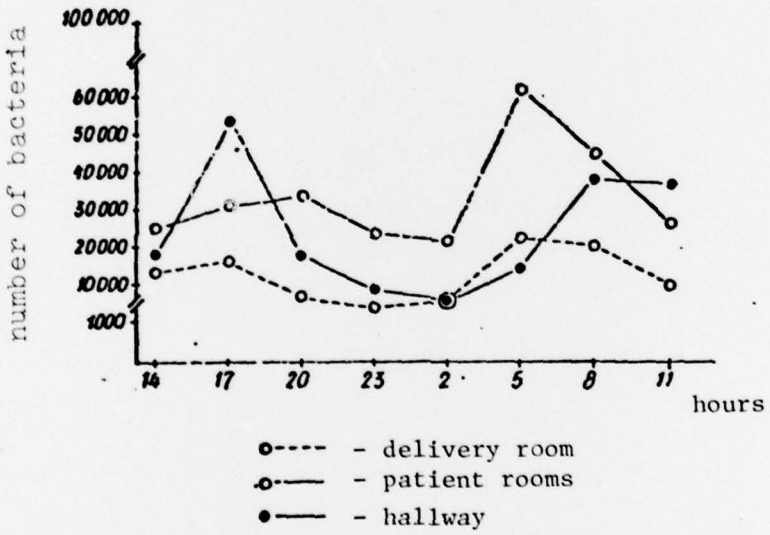

Fig. 3 Diurnal fluctuations of the total number of bacteria in the air of the obstetric and gynecology clinic.

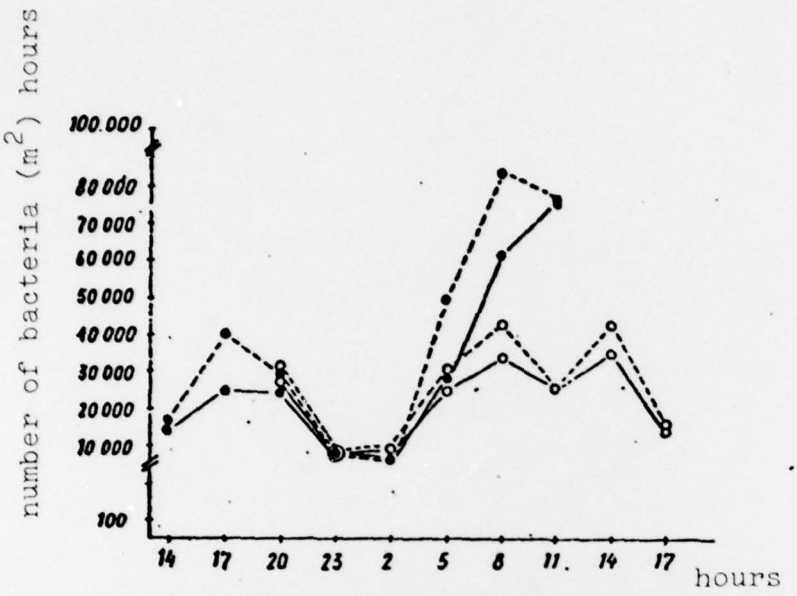

Fig. 4 Diurnal fluctuations of the total number of bacteria in the air of the obstetrics and gynecology clinic.

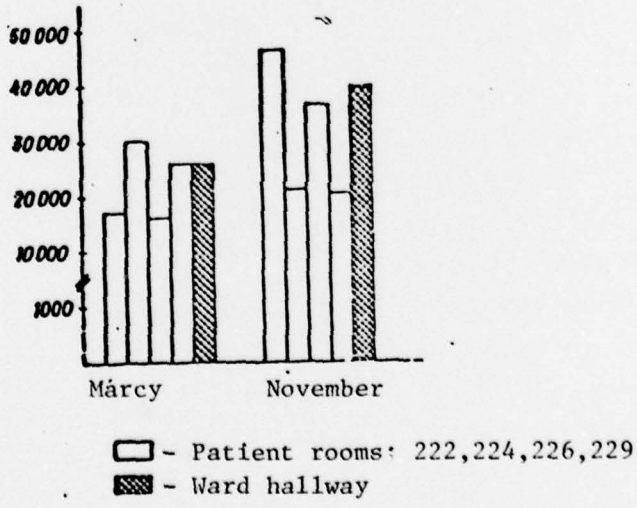

Fig. 5 Diurnal average bacterial count per $1m^2$ per 1 hour.

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Summary

The number of bacteria in the air of a gynecologic ward was lowest at night and highest in the daytime during cleaning hours and after meals. Visits to the patients were followed by an increase in the bacterial counts, mainly of Sarcinae and Bacilli.

The diurnal curves of numbers of bacteria in the air of an obstetric ward varied in different counts, depending on the time and number of deliveries. Practical exercises with students in the wards had an important influence on the bacterial counts.

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